Chapter 6: Project Time Management

Information Technology Project Management, Seventh Edition

Importance of Project Schedules

- Managers often cite delivering projects on time as one of their biggest challenges
- Time has the least amount of flexibility; it passes no matter what happens on a project
- Schedule issues are the main reason for conflicts on projects, especially during the second half of projects

Copyright 2014

Individual Work Styles and Cultural Differences Cause Schedule Conflicts

- Some people prefer to follow schedules and meet deadlines while others do not
- Difference cultures and even entire countries have different attitudes about schedules

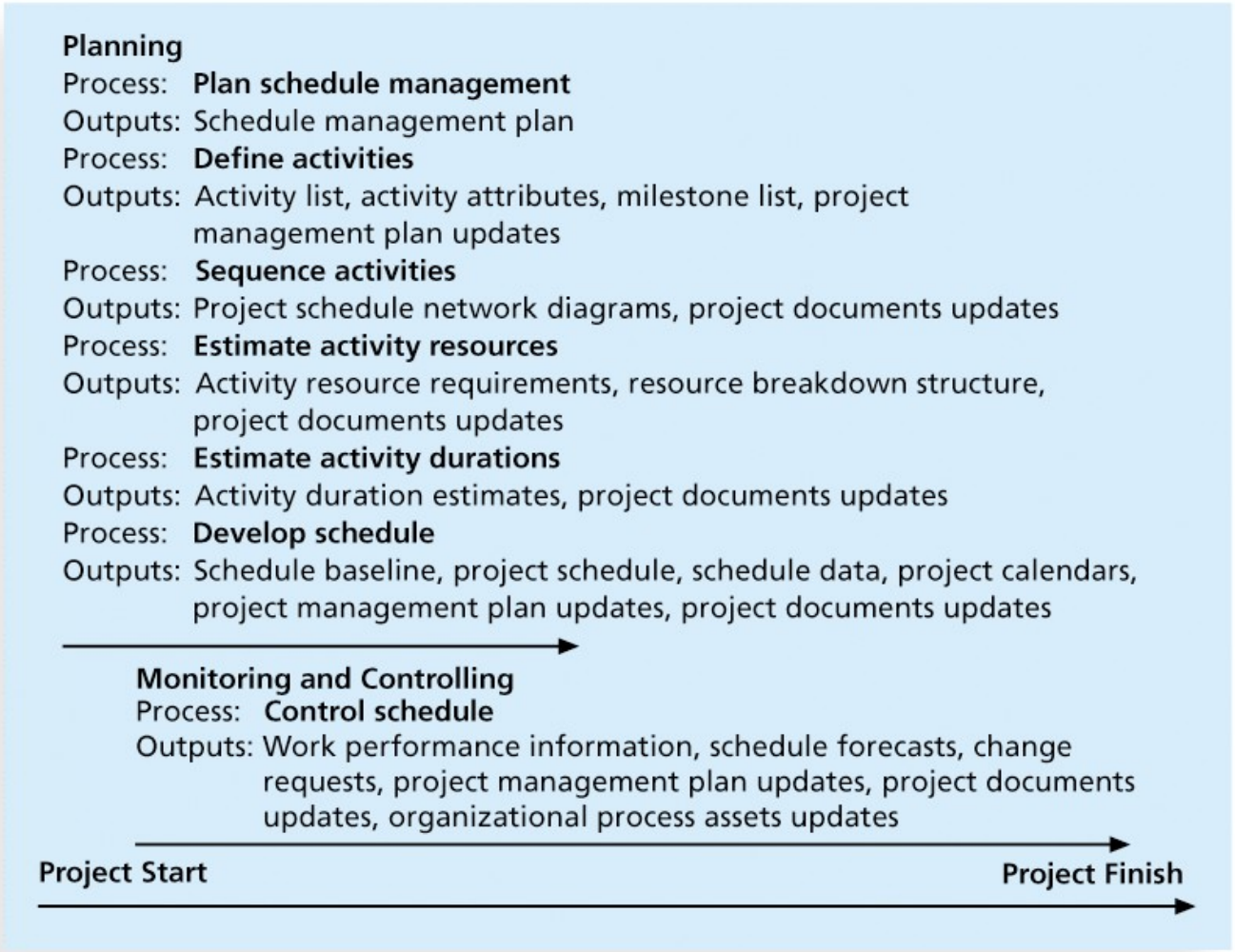
Copyright 2014

Project Time Management Processes

- **Planning schedule management:** determining the policies, procedures, and documentation that will be used for planning, executing, and controlling the project schedule
- **Defining activities:** identifying the specific activities that the project team members and stakeholders must perform to produce the project deliverables
- **Sequencing activities:** identifying and documenting the relationships between project activities
- **Estimating activity resources:** estimating how many **resources** a project team should use to perform project activities
- **Estimating activity durations:** estimating the number of work periods that are needed to complete individual activities
- **Developing the schedule:** analyzing activity sequences, activity resource estimates, and activity duration estimates to create the project schedule
- **Controlling the schedule:** controlling and managing changes to the project schedule

Copyright 2014

Figure 6-1. Project Time Management Summary


Planning
Process: Plan schedule management
Outputs: Schedule management plan
Process: Define activities
Outputs: Activity list, activity attributes, milestone list, project management plan updates
Process: Sequence activities
Outputs: Project schedule network diagrams, project documents updates
Process: Estimate activity resources
Outputs: Activity resource requirements, resource breakdown structure, project documents updates
Process: Estimate activity durations
Outputs: Activity duration estimates, project documents updates
Process: Develop schedule
Outputs: Schedule baseline, project schedule, schedule data, project calendars, project management plan updates, project documents updates
Monitoring and Controlling
Process: Control schedule
Outputs: Work performance information, schedule forecasts, change requests, project management plan updates, project documents updates, organizational process assets updates
Project Start
Project Finish

Copyright 2014

1.Planning Schedule Management

- The project team uses expert judgment, analytical techniques, and meetings to develop the schedule management plan
- A schedule management plan includes:
  - Project schedule model development: Many projects include a schedule model, which contains project activities with estimated durations, dependencies, and other planning information that can be used to produce a project schedule.
  - Level of accuracy and units of measure: This section discusses how accurate schedule estimates should be and determines whether time is measured in hours, days, or another unit.
  - Rules of performance measurement: For example, if team members are expected to track the percentage of work completed, this section specifies how to determine the percentages.
  - Reporting formats: This section describes the format and frequency of schedule reports required for the project.
  - Process descriptions: how all of the schedule management processes will be performed

2. Defining Activities

- An **activity** or **task** is an element of work normally found on the work breakdown structure (WBS) that has an expected duration, a cost, and resource requirements
- Activity definition involves developing a more detailed WBS and supporting explanations to understand all the work to be done so you can develop realistic cost and duration estimates

Copyright 2014

2.1Activity Lists and Attributes

- An **activity list** is a tabulation of activities to be included on a project schedule that includes
  - the activity name
  - an activity identifier or number
  - a brief description of the activity
- **Activity attributes** provide more information such as predecessors, successors, logical relationships, leads and lags, resource requirements, constraints, imposed dates, and assumptions related to the activity

Copyright 2014

2.3 Milestones

- A **milestone** is a significant event that normally has no duration
- It often takes several activities and a lot of work to complete a milestone
- They’re useful tools for setting schedule goals and monitoring progress
- Examples include obtaining customer sign-off on key documents or completion of specific products
- The goal of defining activities is to ensure that the project team completely understands all the work it must do as part of the project scope so they can start scheduling the work.

Copyright 2014

3. Sequencing Activities

- Involves reviewing activities and determining dependencies
- A **dependency** or **relationship** is the sequencing of project activities or tasks
- You *must* determine dependencies in order to use critical path analysis

Copyright 2014

3.1 Three types of Dependencies

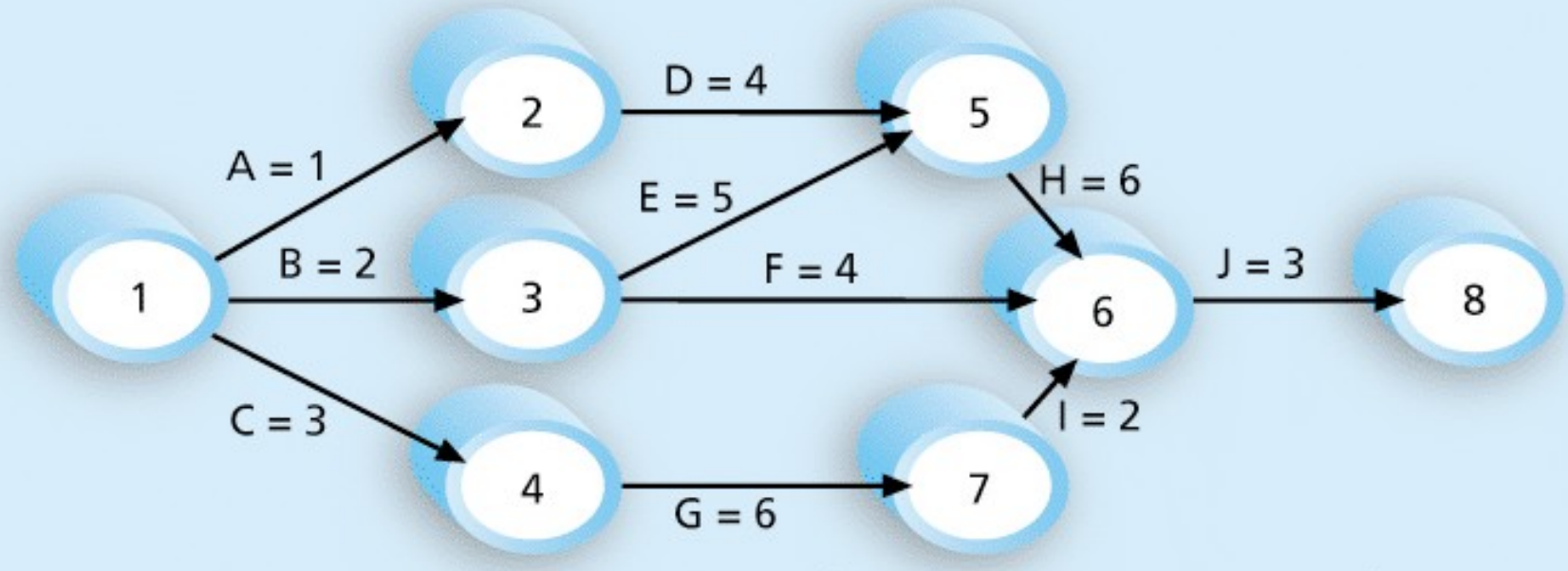
- **Mandatory dependencies:** inherent in the nature of the work being performed on a project, (ex. You cannot test a code until a code is written)
- **Discretionary dependencies:** defined by the project team., sometimes referred to as soft logic and should be used with care since they may limit later scheduling options (ex. Don’t start design until we get a user sign off all the analysis work)
- **External dependencies:** involve relationships between project and non-project activities (ex installation of new software depend on the delivery of new

3.2 Network Diagrams

- Network diagrams are the preferred technique for showing activity sequencing
- A **network diagram** is a schematic display of the logical relationships among, or sequencing of, project activities

Copyright 2014

Figure 6-2. Network Diagram for Project X



Note: Assume all durations are in days; A=1 means Activity A has a duration of 1 day.

Copyright 2014

3.2 Arrow Diagramming Method (ADM)

- Also called activity-on-arrow (AOA) network diagrams
- Activities are represented by arrows
- Nodes or circles are the starting and ending points of activities
- Can only show finish-to-start dependencies

Copyright 2014

4.Estimating Activity Resources

- Before estimating activity durations, you must have a good idea of the quantity and type of resources that will be assigned to each activity; **resources** are people, equipment, and materials
- Consider important issues in estimating resources
  - How difficult will it be to do specific activities on this project?
  - What is the organization's history in doing similar activities?
  - Are the required resources available?
- A **resource breakdown structure** is a hierarchical structure that identifies the project's resources by category and type

5. Activity Duration Estimating

- **Duration** includes the actual amount of time worked on an activity *plus* elapsed time
- **Effort** is the number of workdays or work hours required to complete a task
- Effort does not normally equal duration
- Duration relates to the time estimate on a calendar, not the effort estimate.
- People doing the work should help create estimates, and an expert should review them

Copyright 2014

5.1 Three-Point Estimates

- Instead of providing activity estimates as a discrete number, such as four weeks, it's often helpful to create a **three-point estimate**
  - an estimate that includes an optimistic, most likely, and pessimistic estimate, such as three weeks for the optimistic, four weeks for the most likely, and five weeks for the pessimistic estimate

Copyright 2014

6.Developing the Schedule

- Uses results of the other time management processes to determine the start and end date of the project
- Ultimate goal is to create a realistic project schedule that provides a basis for monitoring project progress for the time dimension of the project
- Important tools and techniques include Gantt charts, critical path analysis, and critical chain scheduling, and PERT analysis

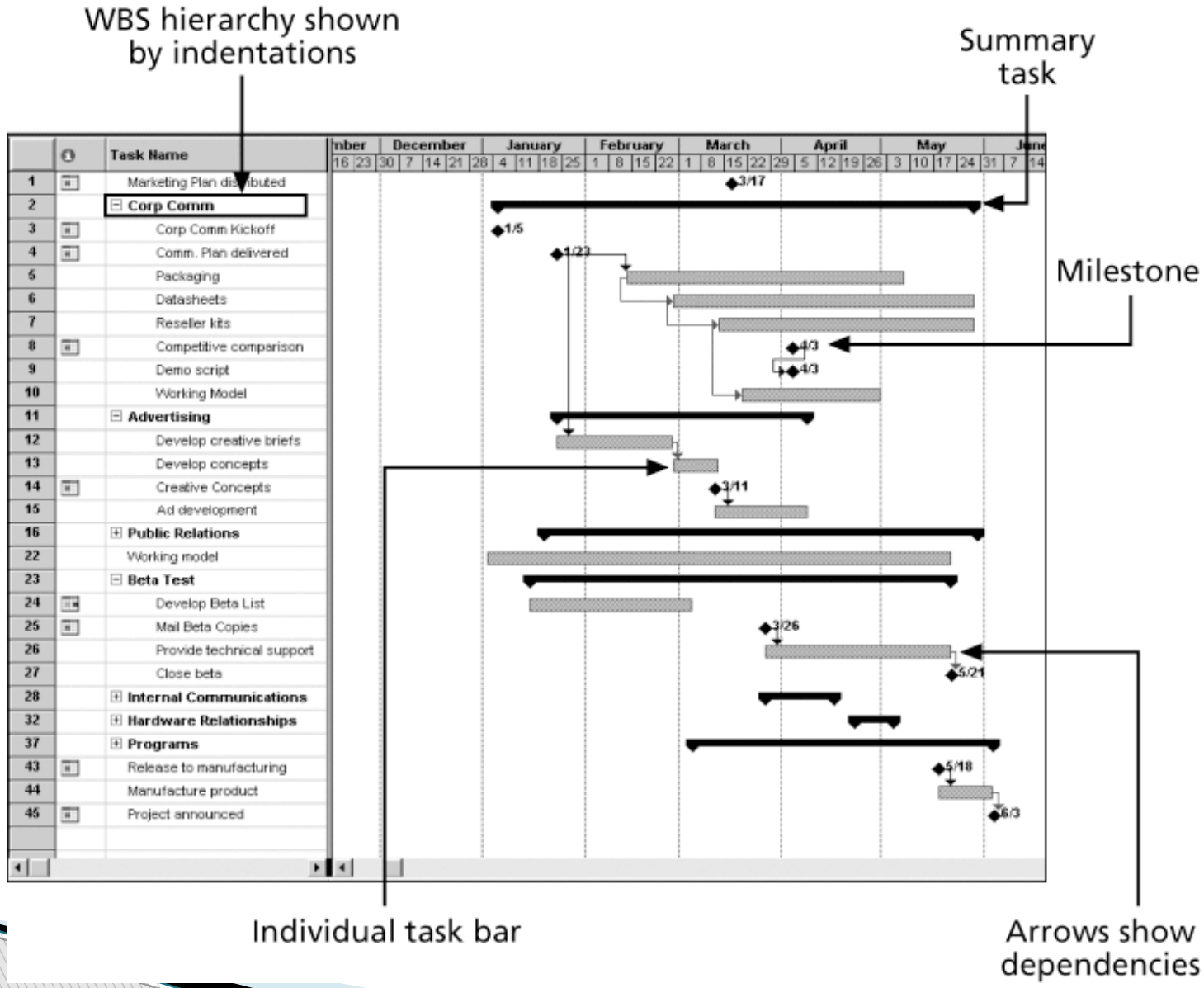
Copyright 2014

6.1 Gantt Charts

- **Gantt charts** provide a standard format for displaying project schedule information by listing project activities and their corresponding start and finish dates in a calendar format
- Symbols include:
  - A black diamond: a milestones
  - Thick black bars: summary tasks
  - Lighter horizontal bars: durations of tasks
  - Arrows: dependencies between tasks

Copyright 2014

Figure 6-6. Gantt Chart for Software Launch Project



Copyright 2014

Adding Milestones to Gantt Charts

- Many people like to focus on meeting milestones, especially for large projects
- Milestones emphasize important events or accomplishments on projects
- Normally create milestone by entering tasks with a zero duration, or you can mark any task as a milestone

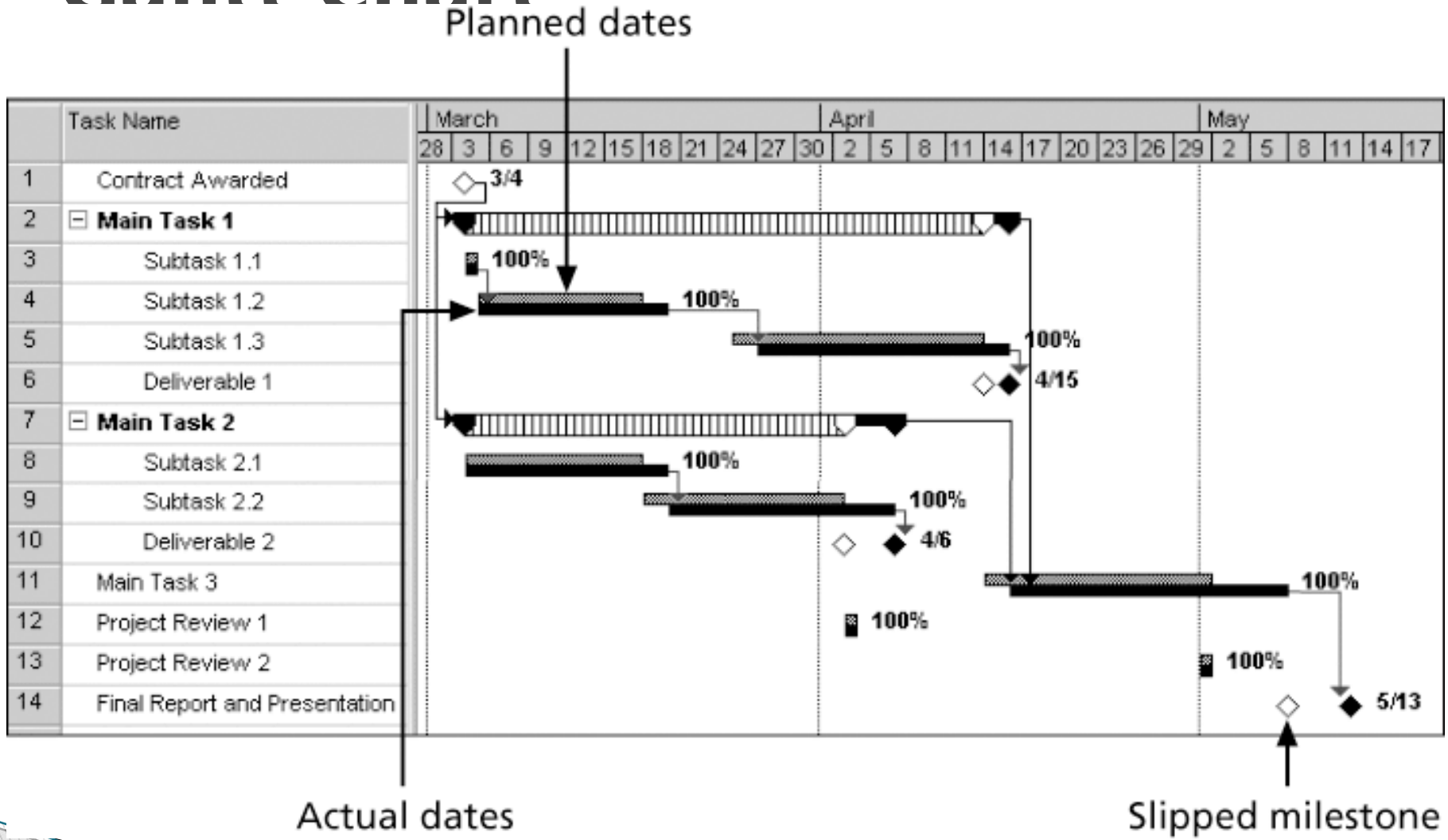
Copyright 2014

6.2 tracking Gantt Chart

- You can use a special form of a Gantt chart to evaluate progress on a project by showing actual schedule information. **Figure 6-7** shows a **Tracking Gantt chart**—a Gantt chart that compares planned and actual project schedule information.

Copyright 2014

Figure 6-7. Sample Tracking Gantt Chart



Copyright 2014

6.3 Critical Path Method (CPM)

- **CPM** is a network diagramming technique used to predict total project duration
- A **critical path** for a project is the series of activities that determines the *earliest time* by which the project can be completed
- The critical path is the *longest path* through the network diagram and has the least amount of slack or float
- **Slack** or **float** is the amount of time an activity may be delayed without delaying a succeeding activity or the project finish date

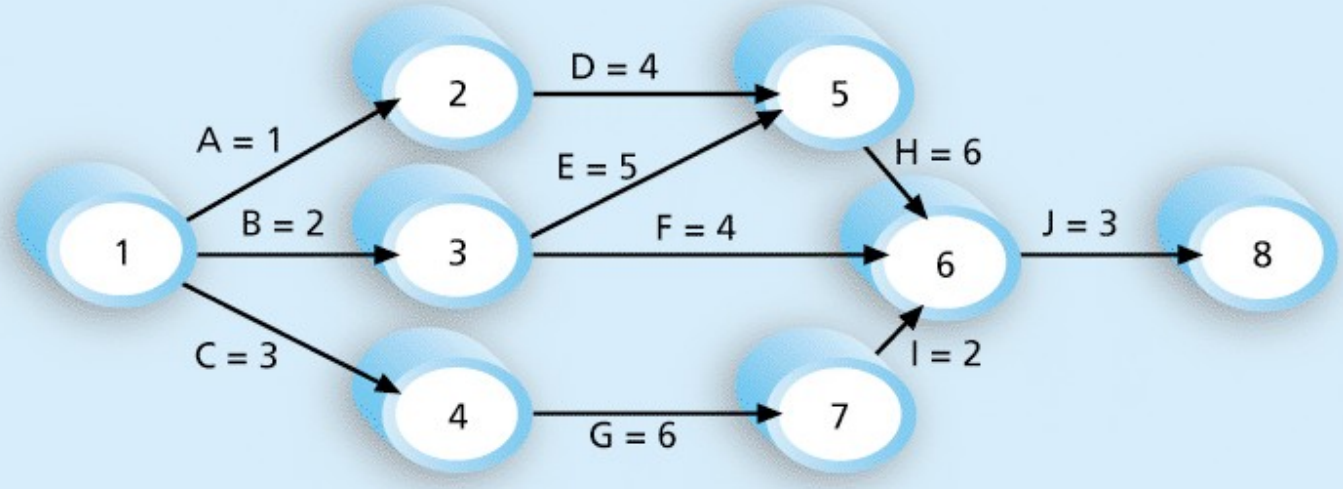
Copyright 2014

6.3Calculating the Critical Path

- First develop a good network diagram
- Add the duration estimates for all activities on each path through the network diagram
- The longest path is the critical path
- If one or more of the activities on the critical path takes longer than planned, the whole project schedule will slip *unless* the project manager takes corrective action

Copyright 2014

Figure 6-8. Determining the Critical Path for Project X



Note: Assume all durations are in days.

Path 1:	A-D-H-J	Length = 1+4+6+3 = 14 days
Path 2:	B-E-H-J	Length = 2+5+6+3 = 16 days
Path 3:	B-F-J	Length = 2+4+3 = 9 days
Path 4:	C-G-I-J	Length = 3+6+2+3 = 14 days

Since the critical path is the longest path through the network diagram, Path 2, B-E-H-J, is the critical path for Project X.

Copyright 2014

6.3More on the Critical Path

- A project team at Apple computer put a stuffed gorilla on the top of the cubicle of the person currently managing critical task
- The critical path is *not* the one with all the critical activities; it only accounts for time
- There can be more than one critical path if the lengths of two or more paths are the same
- The critical path can change as the project progresses

Copyright 2014

6.4 Using the Critical Path to Shorten a Project Schedule

- Three main techniques for shortening schedules
  - Shortening durations of critical activities/tasks by adding more resources or changing their scope
  - **Crashing** activities by obtaining the greatest amount of schedule compression for the least incremental cost
  - **Fast tracking** activities by doing them in parallel or overlapping them

Copyright 2014

6.5Importance of Updating Critical Path Data

- It is important to update project schedule information to meet time goals for a project
- The critical path may change as you enter actual start and finish dates
- If you know the project completion date will slip, negotiate with the project sponsor

Copyright 2014

7. Controlling the Schedule

- Goals are to know the status of the schedule, influence factors that cause schedule changes, determine that the schedule has changed, and manage changes when they occur
- Tools and techniques include
  - Progress reports
  - A schedule change control system
  - Project management software, including schedule comparison charts like the tracking Gantt chart
  - Variance analysis, such as analyzing float or slack

Copyright 2014

Reality Checks on Scheduling

- First review the draft schedule or estimated completion date in the project charter
- Prepare a more detailed schedule with the project team
- Get stakeholders approval
- To establish the schedule, it is critical to get involvement and commitment from all project team members, top management, the customer, and other key stakeholders.
- Make sure the schedule is realistic and followed
- Alert top management well in advance if there are schedule problems

Copyright 2014

Using Software to Assist in Time Management

- Software for facilitating communications helps people exchange schedule-related information
- Decision support models help analyze trade-offs that can be made
- Project management software can help in various time management areas

Copyright 2014

Chapter Summary

- Project time management is often cited as the main source of conflict on projects, and most IT projects exceed time estimates
- Main processes include
  - Plan schedule management
  - Define activities
  - Sequence activities
  - Estimate activity resources
  - Estimate activity durations
  - Develop schedule
  - Control schedule

Copyright 2014